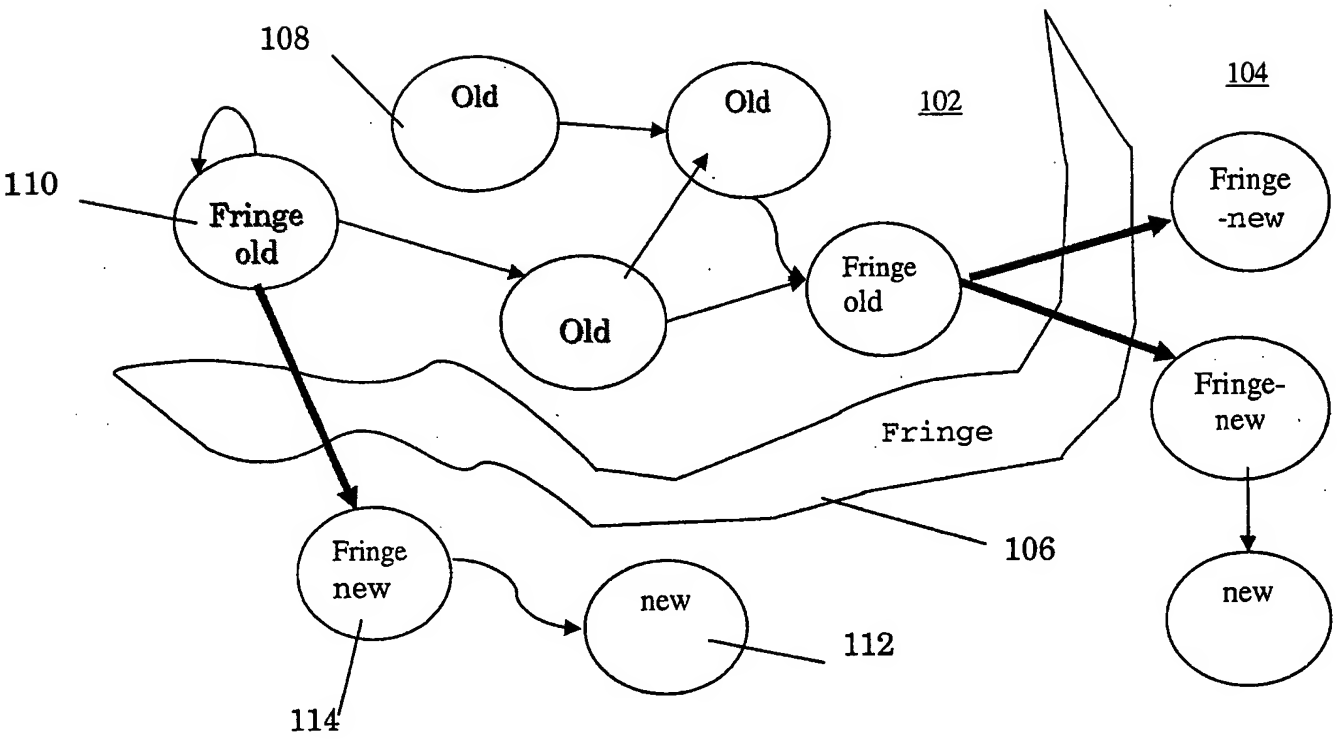


FIG. 1
Prior Art

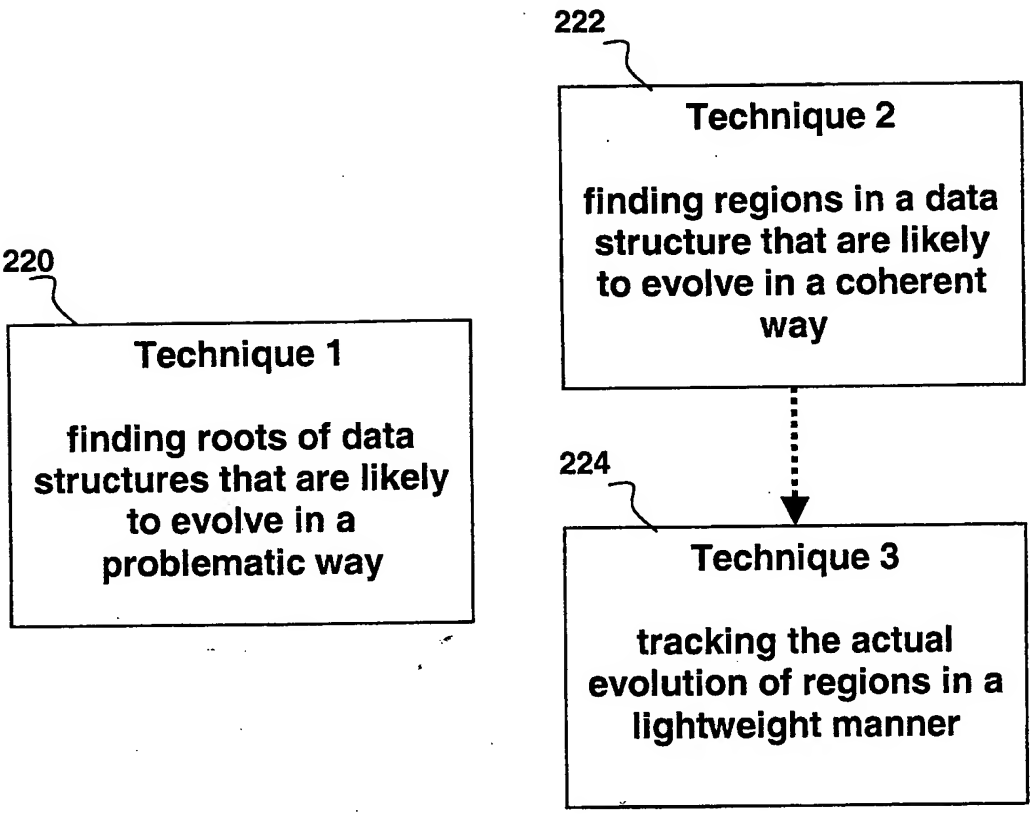

220
Technique 1
finding roots of data structures that are likely to evolve in a problematic way
222
Technique 2
finding regions in a data structure that are likely to evolve in a coherent way
224
Technique 3
tracking the actual evolution of regions in a lightweight manner

FIG. 2

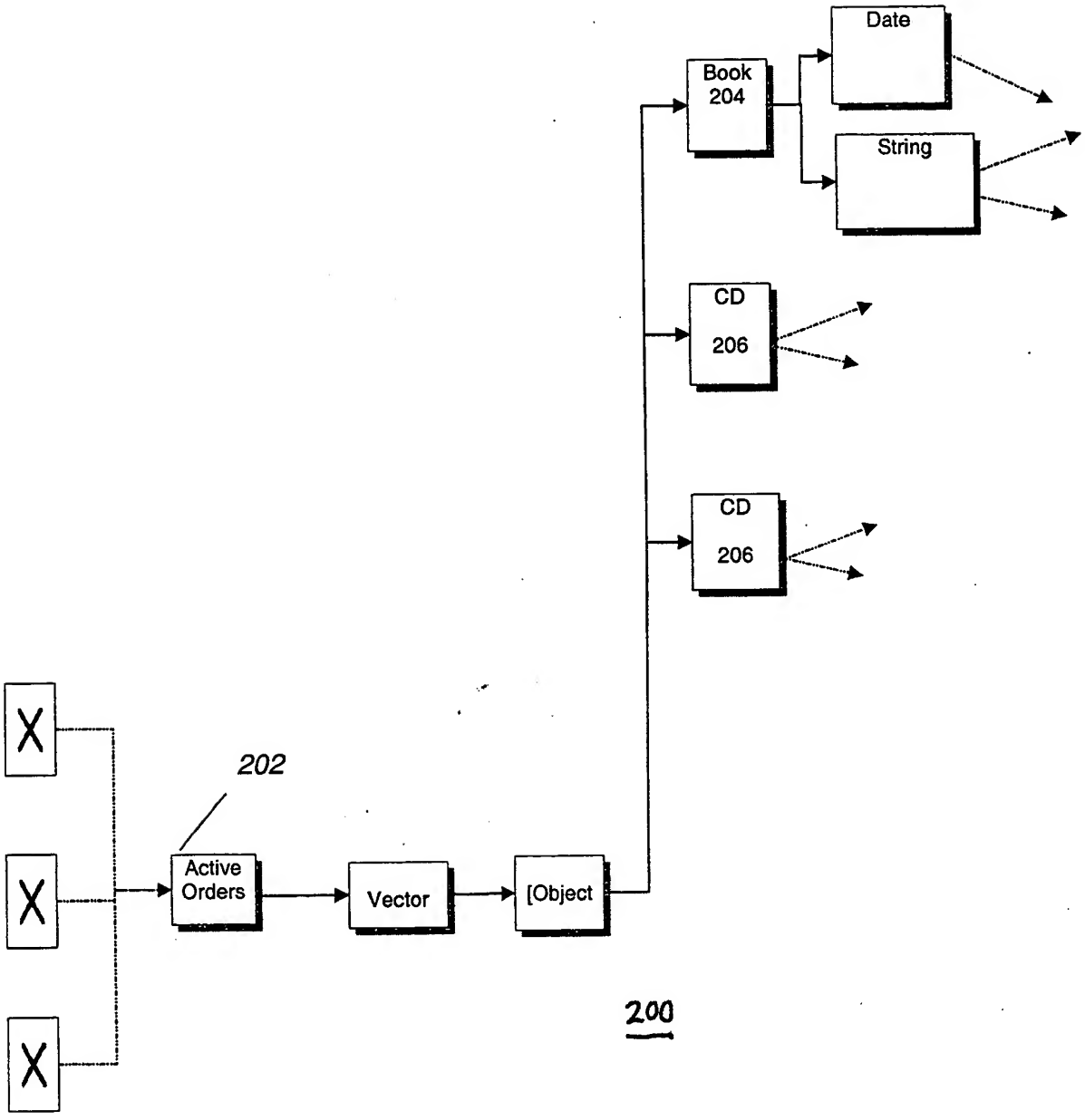

Date
Book
204
String
CD
206
CD
206
202
Active
Orders
Vector
[Object
200

FIG. 2A

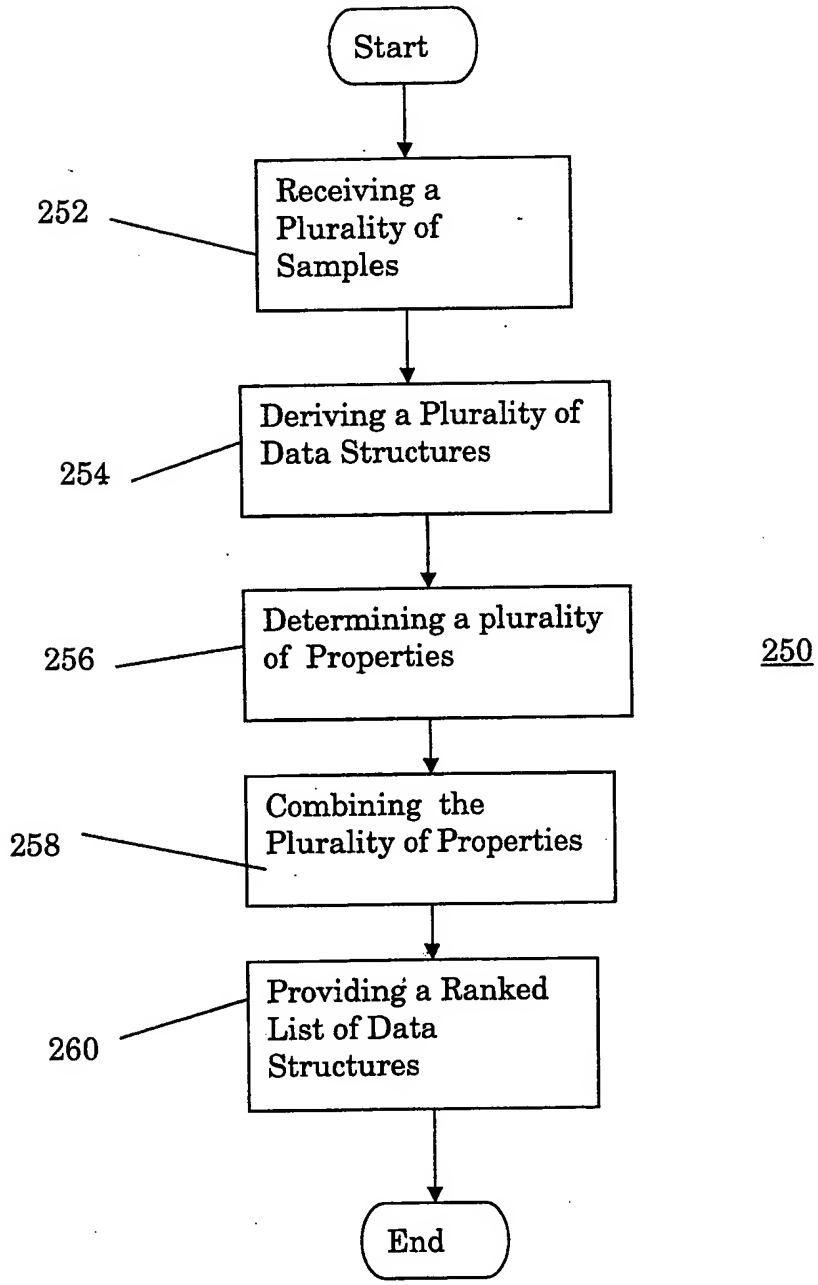
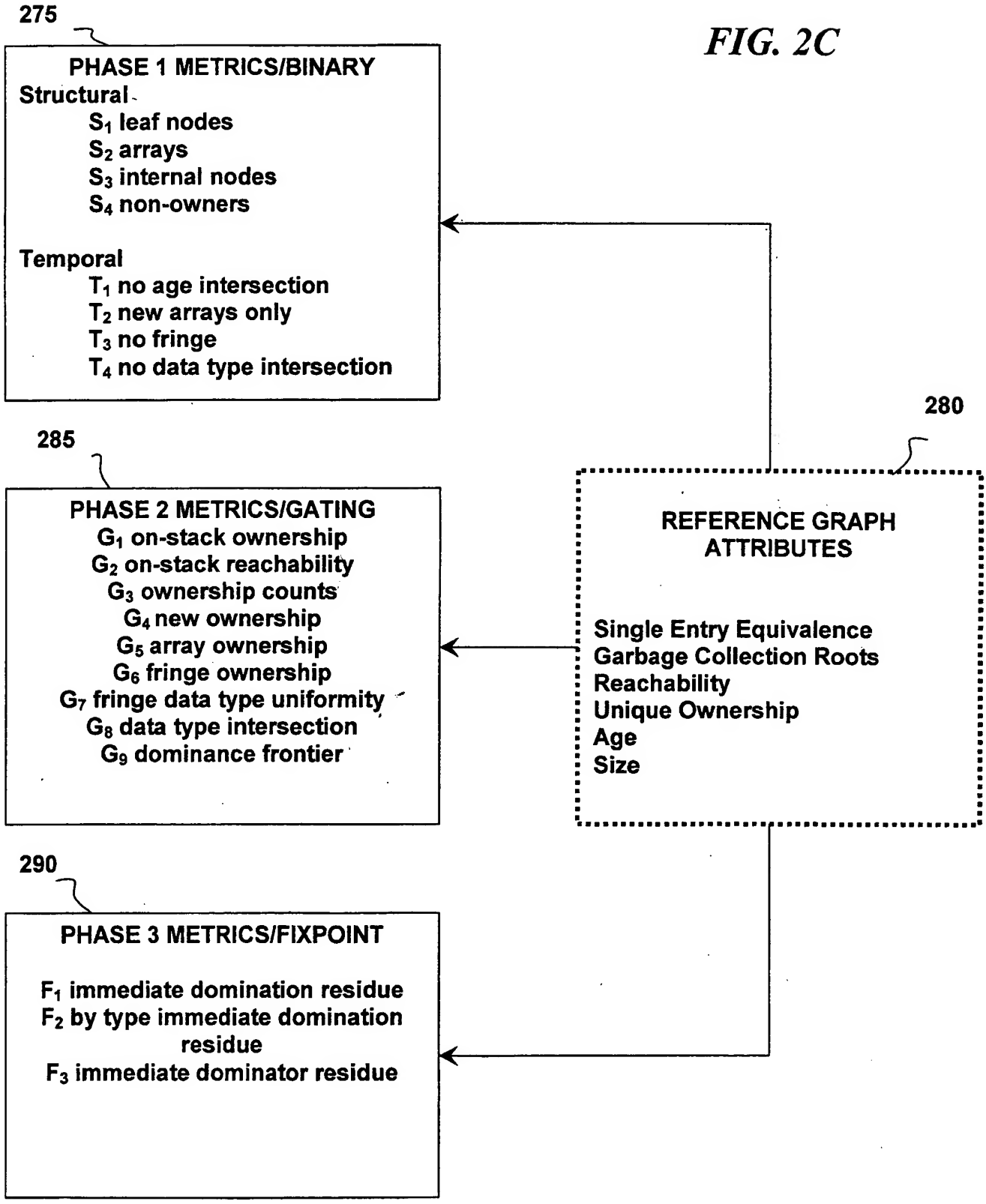

Start
Receiving a Plurality of Samples
252
Deriving a Plurality of Data Structures
254
Determining a plurality of Properties
256
250
Combining the Plurality of Properties
258
Providing a Ranked List of Data Structures
260
End

FIG. 2B

FIG. 2C


275
PHASE 1 METRICS/BINARY
Structural
S_1 leaf nodes
S_2 arrays
S_3 internal nodes
S_4 non-owners
Temporal
T_1 no age intersection
T_2 new arrays only
T_3 no fringe
T_4 no data type intersection
280
285
PHASE 2 METRICS/GATING
G_1 on-stack ownership
G_2 on-stack reachability
G_3 ownership counts
G_4 new ownership
G_5 array ownership
G_6 fringe ownership
G_7 fringe data type uniformity
G_8 data type intersection
G_9 dominance frontier
REFERENCE GRAPH ATTRIBUTES
Single Entry Equivalence
Garbage Collection Roots
Reachability
Unique Ownership
Age
Size
290
PHASE 3 METRICS/FIXPOINT
F_1 immediate domination residue
F_2 by type immediate domination residue
F_3 immediate dominator residue

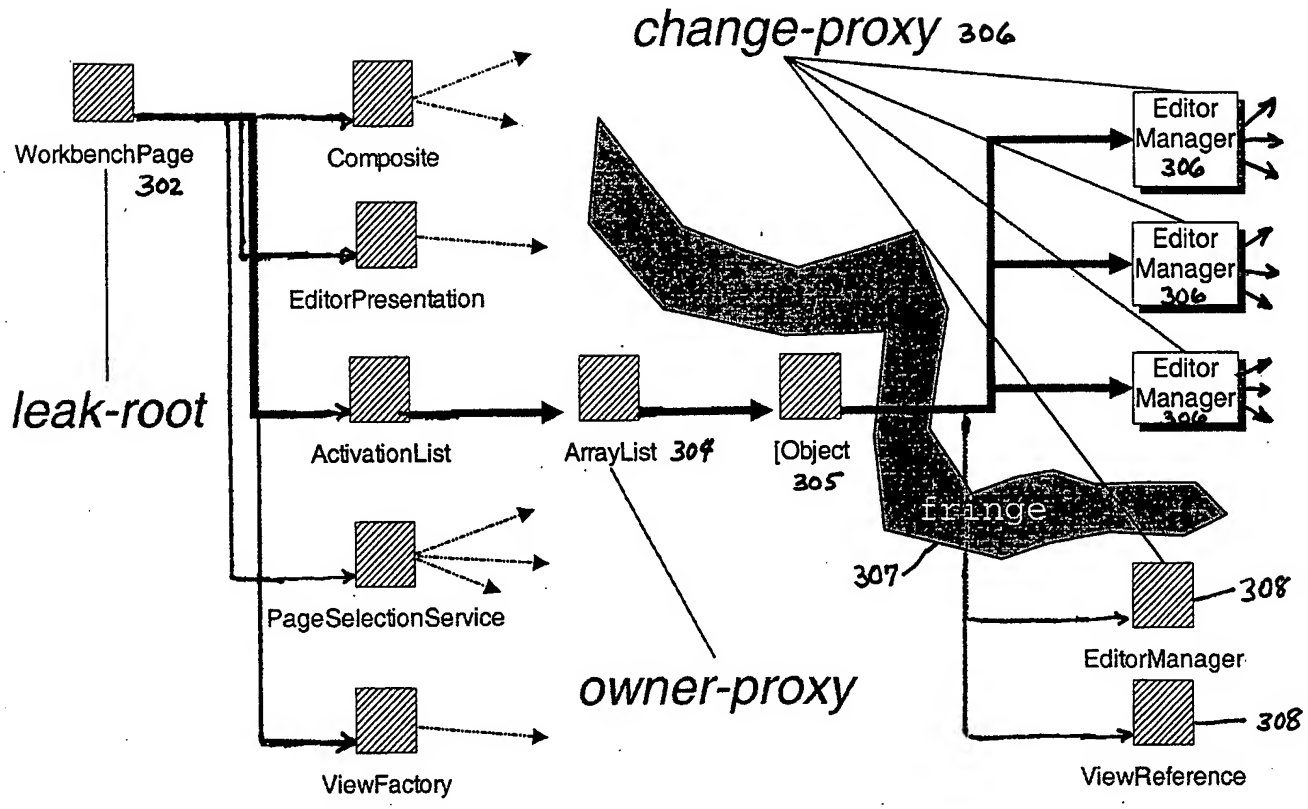

change-proxy 306
WorkbenchPage
302
Composite
EditorPresentation
leak-root
ActivationList
ArrayList 304
[Object
305
Editor
Manager
306
Editor
Manager
306
Editor
Manager
306
fringe
307
PageSelectionService
owner-proxy
308
EditorManager
308
ViewFactory
ViewReference

FIG. 3A

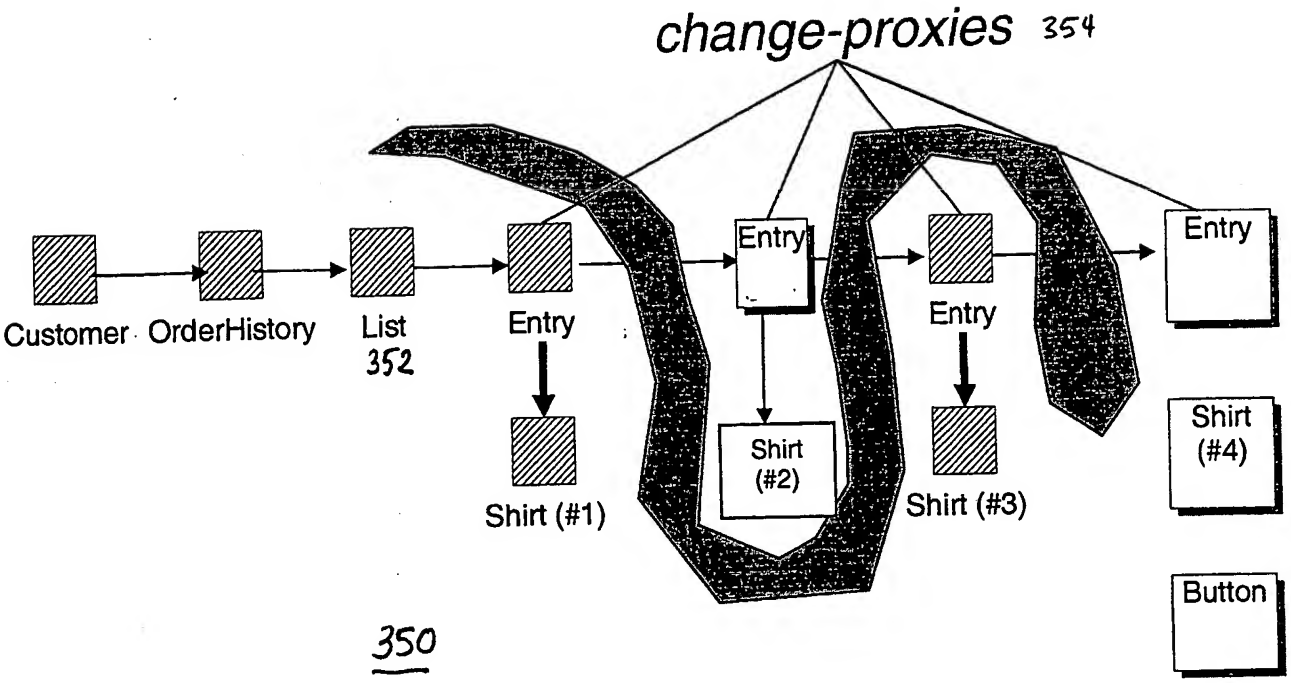

change-proxies 354
Customer
OrderHistory
List
352
Entry
Shirt (#1)
Entry
Shirt (#2)
Entry
Shirt (#3)
Entry
Shirt (#4)
Button
350

FIG. 3B

Leakbot Display Options

Rate of leak	Leak root	Owner-proxy	Change-proxy	#Leakees	Trend	Tick
10.554	simpleleaker class obj...	Vector object	by type:Integer	8100	grower	grower
3.28	simpleleaker class obj...	Vector object	by type:Character	151	grower	grower
1.379	simpleleaker class obj...	LinkedList$Entry object	by type:LinkedList$Entry	5	grower	grower
1.129	simpleleaker class obj...	LinkedList$Entry object	by type:LinkedList$Entry	4	grower	grower
0.587	simpleleaker class obj...	Vector object	by type:Boolean	900	flatliner	flatliner

Tracking grower in jinsight.leaky.AdditionTemplate@9a4f8e; size estimate=151.
Tracking flatliner in jinsight.leaky.AdditionTemplate@10cceb3; size estimate=900.
Decreasing arm rate of jinsight.leaky.AdditionTemplate@10cceb3 to 0.80999994

FIG. 5

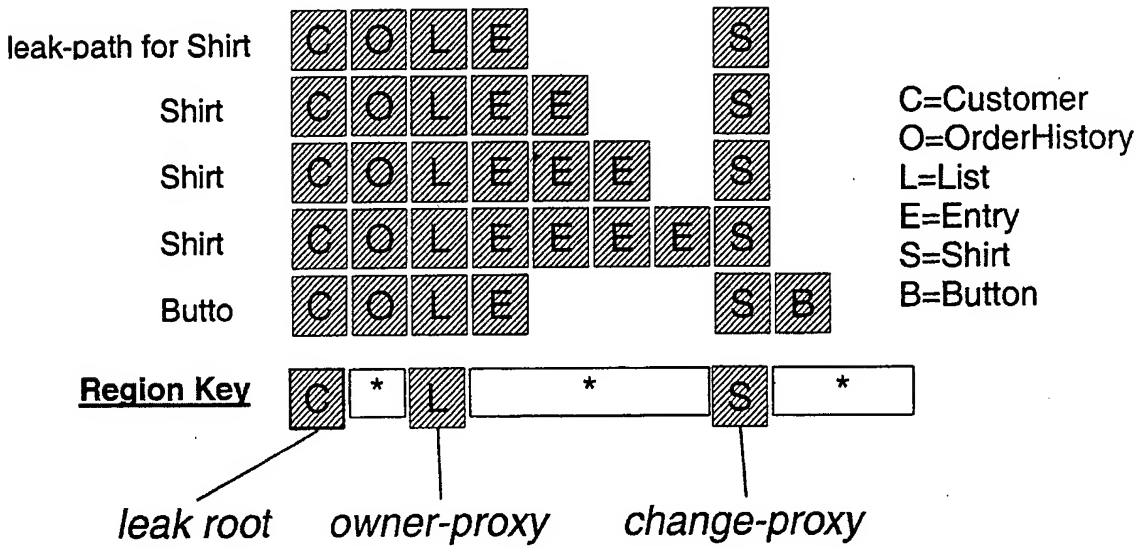
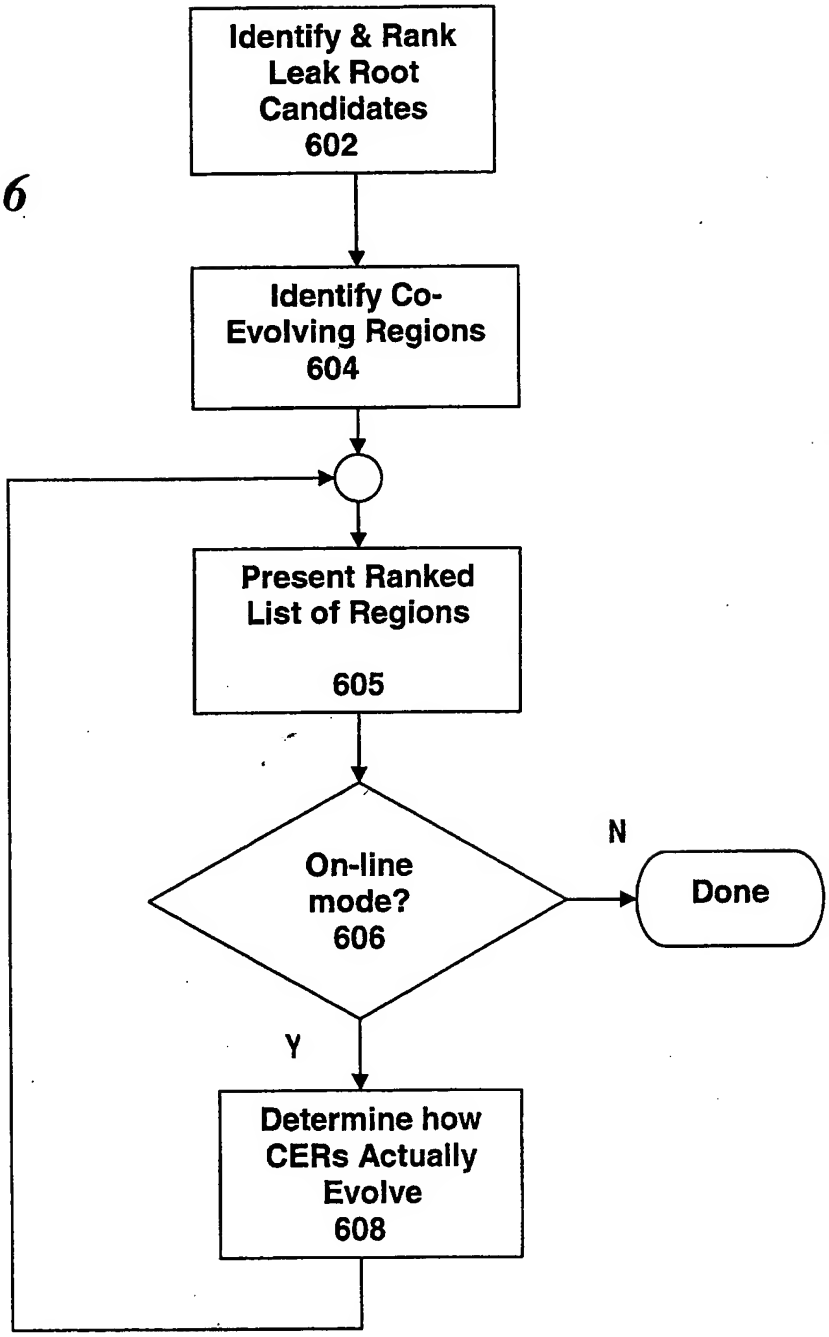


FIG. 4

FIG. 6


Identify & Rank Leak Root Candidates 602
Identify Co-Evolving Regions 604
Present Ranked List of Regions 605
On-line mode? 606
N
Done
Y
Determine how CERs Actually Evolve 608

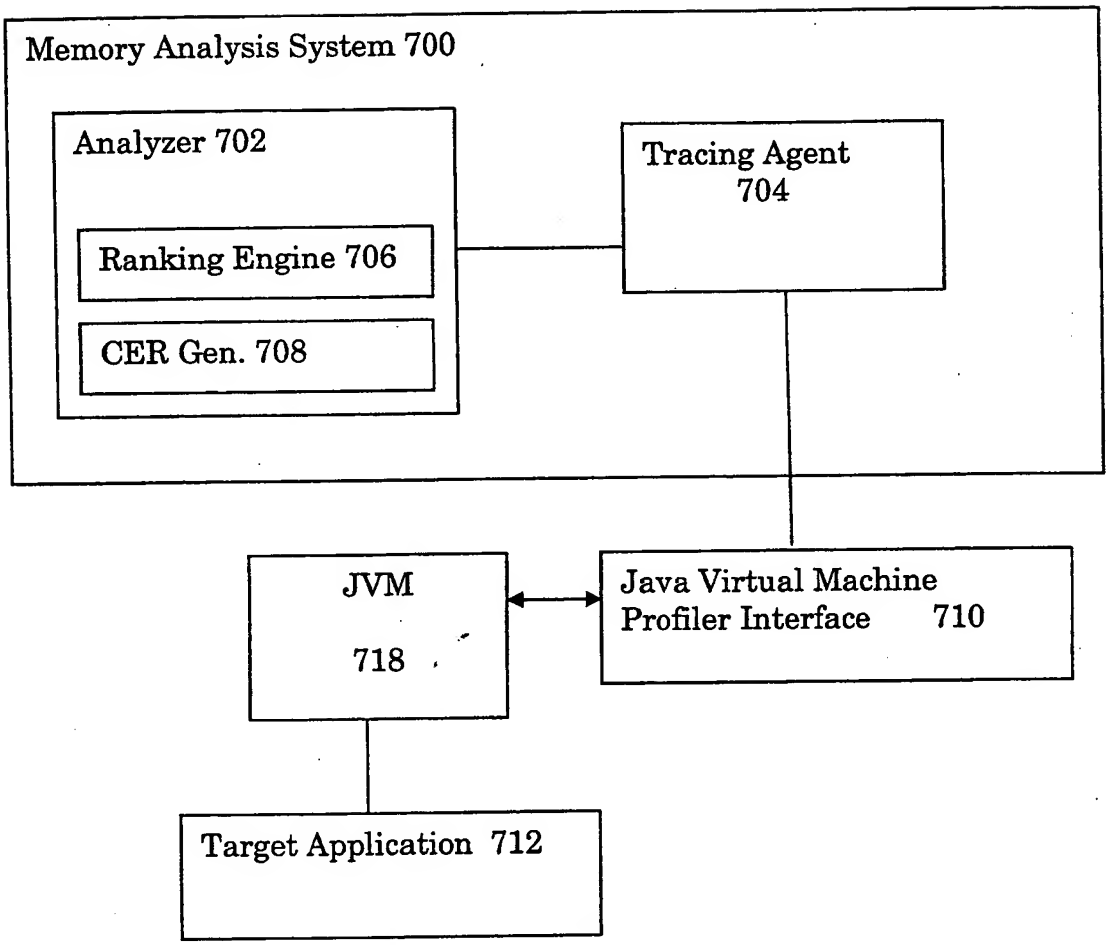

Memory Analysis System 700
Analyzer 702
Ranking Engine 706
CER Gen. 708
Tracing Agent
704
JVM
718
Java Virtual Machine
Profiler Interface 710
Target Application 712

FIG. 7